

NON-PUBLIC?: N  
ACCESSION #: 9102210225  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Peach Bottom Atomic Power Station - PAGE: 1 OF 06  
Unit 3

DOCKET NUMBER: 05000278

TITLE: Reactor Scram Following '3A' Main Transformer Failure  
EVENT DATE: 01/16/91 LER #: 91-001-00 REPORT DATE: 02/15/91

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 058

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: A. A. Fulvio, Regulatory Engineer TELEPHONE: (717) 456-7014

COMPONENT FAILURE DESCRIPTION:  
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:  
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On 1/16/91 at 1238 hours a reactor scram occurred on Unit 3 due to Turbine Control Valve fast closure on a Main Generator Load Reject signal caused by a Main Transformer sudden pressure lockout signal. A Primary Containment Isolation System (PCIS) Group II/III isolation occurred as expected due to the Reactor Water level decrease following the scram. The load reject was initiated by actuation of the sudden pressure trip device on the '3A' Main Transformer when the fire system deluge was manually actuated in an attempt to cool down the overheating transformer. The transformer was overheating due to a loss of power to its cooling system. During performance of the procedure for resetting a scram, a second scram occurred as a result of procedural non-compliance. The cause of the first event was component failure and inadequate equipment design. The adequacy of the cooling system power supply circuit design is being evaluated. Information on this event will be included in Plant

Operator and Licensed Operator training. The Operator involved in the second scram was coached by the Shift Manager and the Superintendent of Operations with regard to following procedures. No previous similar LERs have been identified.

END OF ABSTRACT

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### Requirements for the Report

This report is submitted to satisfy the requirements of 10 CFR 50.73(a)(2)(iv) because of unplanned Engineered Safety Feature (Reactor Protection System {RPS} {EHS:JC}) Actuations.

### Unit Conditions at Time of Event

Unit 3 was in the RUN mode at 58% of rated thermal reactor (EHS:RPV) power. The Unit 3 'A' Main Transformer (EHS:XFMR) was overheating due to failure of its cooling system. Reactor power was being reduced from 100% power in order to take the transformer off line.

During the second scram Unit 3 was in hot shutdown.

### Description of Event

On 1/16/91 at 1238 hours a reactor scram occurred due to Turbine Control Valve fast closure on a Main Generator Load Reject signal caused by a Main Transformer sudden pressure lockout signal. A Primary Containment Isolation System (PCIS)(EHS:JM) Group II/III isolation occurred as expected due to the level decrease following the scram.

The '3A' Main Transformer cooling system failed and was causing the transformer to overheat. The generator lockout was initiated by actuation of the sudden pressure trip on the transformer when the fire system deluge was manually actuated in an attempt to cool down the overheating transformer.

At approximately 1133 hours a common Unit 3 Main Transformer trouble alarm was received. The Chief Operator (CO)(Licensed, Utility) made an attempt to contact a Plant Operator (PO)(Non-licensed, Utility) to investigate the problem.

Before that contact was made, Maintenance (Utility, non-licensed) personnel radioed the Control Room at approximately 1225 hours and reported that there was smoke or steam coming from one of the Unit 3 Main

Transformers, or that the fire system deluge system was spraying water on the transformer. A Floor Foreman (FF) in a nearby trailer heard the radio transmissions and looked out the window. The FF verified that the 3A Main Transformer was in fact smoking and that the deluge system was not spraying water onto it.

By 1230, the FF was at the '3A' Main Transformer and discovered that several local alarms were up. The FF also noted that there were no cooling fans (EIIS:FAN) running on the transformer due to a loss of power to the fans. The Main Transformers are cooled by a system of pumps and fans that make up a "bank". Each Transformer has two banks which consist of three pumps that circulate the oil and nine fans that draw air across the cooling fins. In the normal setup, one bank runs continuously and the second bank cycles on and off automatically.

The FF then radioed the control room and reported the transformer conditions, requested that a Shift Supervisor (SSV)(Utility, Licensed) respond to the scene, and

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recommended that action be taken to take the generator off line. At that time, a rapid shutdown commenced and a SSV responded to the scene.

In response to the loss of power to the fans, the FF contacted the CO and requested that an Operator be dispatched to check the normal power feed. Each transformer's control power is supplied from a preferred 480V supply breaker (See Figure 1), which transfers to an alternate feed on an undervoltage condition. These supply breakers then feed six branch breakers which feed three fan motors and one oil circulating pump each. The shift personnel dispatched to the Main supply breaker found the breaker tripped and attempted to reclose it. The breaker tripped free. A second attempt to reclose the breaker resulted in a similar trip. By then, the FF and SSV discovered that the control power failed to transfer to the the alternate feed due to a defective auto transfer undervoltage relay (EIIS:RLY).

During this time period, a decision was made to evacuate part of the Administration Building which is located adjacent to the transformer due to concerns that a transformer fire or explosion might occur. Access to the vicinity of the transformer was restricted, a plant P.A. announcement was made, and operators were sent through the Administration Building to aid in the evacuation announcement.

At 1238 it was felt that it was improbable that control power would be restored to the cooling system. Based on these observations, the SSV

believed that transformer failure was a real possibility. He then radioed the CO and told him that he wanted an operator to initiate the Fire System Deluge on the 3A Main Transformer and that a Main Generator lockout may result. A Generator lockout occurs on actuation of the sudden pressure relay which monitors transformer gas space pressure. At that point, the reactor was at about 58% power.

When the operator manually initiated the Deluge system, a '3A' Main Transformer sudden pressure trip occurred followed by a generator lockout. The reactor scrammed at 1238 hours due to control valve fast closure on the generator lockout. A PCIS Group II/III isolation occurred as expected as RPV water level momentarily dropped following the scram.

At 1245 hours the Deluge system was isolated and the power was restored to the transformer cooling system. The PCIS Group II/III isolations were reset at 1250 hours. The PCIS Group II/III isolation lasted for 12 minutes. The NRC was notified of the event via ENS at 1324 hours.

During performance of the procedure for resetting a scram, a second scram occurred at 1257 hours as a result of procedural non-compliance. This was the first time that the Reactor Operator (RO) (Utility, Licensed) had performed an actual recovery from a scram. After the Operator opened the Scram Discharge Volume (SDV) vent and drain valves the procedure directed the Operator to wait for two alarms (EHS:LA) to clear. The procedure indicates that 15 to 25 minutes may be required for the alarms to clear. Instead, the Operator immediately continued with the procedure without checking the alarms. When the SDV High Water Level Bypass Switch was returned to the normal position, the second scram occurred as a result of the SDV not being fully drained. The Chief Operator then assisted the RO in the remainder of the scram recovery. The NRC was notified of the second scram via ENS at 1435 hours.

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#### Cause of Event

The cause of the first event was component failure and inadequate equipment design. The transformer cooling system consists of 18 fans and 6 circulating pumps. The event was initiated when one of the fans short circuited. A branch circuit breaker should have tripped in response to the short circuit removing only three fans and one pump from service. However, during this event, the main breaker supplying all transformer fans and pumps tripped instead of the individual branch breaker causing a total loss of cooling. The Main breaker tripped at the proper setting to protect the motor control center. The individual branch breakers are vendor supplied, non-adjustable and trip at a setpoint higher than the

main breaker. Additionally, failure of the cooling system undervoltage auto transfer relay prevented the alternate feed breaker from automatically supplying power to the cooling system when the main breaker tripped. The failure was caused by excessive wear in the auto transfer relay. Based on the breaker trip setting coordination problems and the failed attempts to reclose the main breaker, closure of the alternate breaker would not have prevented the total loss of cooling.

Had the loss of power and the overheating condition been discovered earlier, the probability of recovery might have been greater and the scram might have been prevented. In discussion with the CO, it was recognized that the response time to get an individual to the transformer following the initial alarm was too long during this event. Operations management determined after coaching the CO that further action was not required.

The cause of the second scram was due to procedure non-compliance. A step requiring verification of cleared annunciators was not performed. Being the first scram recovery that this newly licensed Operator performed, inexperience played a role in overlooking the required procedure step.

#### Analysis of Event

The overheating of the '3A' Main Transformer presented a personnel safety concern in that an explosion and/or fire could have resulted. In response, Shift Management took prompt and conservative action to evacuate the Administration Building. NRC Information Notice 82-53 indicates that sudden cooling of an overheated and energized transformer could cause damage. However, based on the information available to the SSV that transformer failure may have been imminent, the initiation of the Fire System Deluge was warranted. Even though the generator lockout resulted in a reactor scram, Operations personnel were already performing a fast power reduction in anticipation of taking the generator off line to minimize damage to the transformer.

On 1/18/91, two meetings were held with Station Management, Engineering, and Maintenance personnel to determine if any damage occurred to the transformer. Based on subsequent testing results, it was determined that the transformer was acceptable for return to service.

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The consequences of the second scram were minimal. RPS functioned as designed and no control rod motion occurred since all rods were already inserted. Improper manipulation of the SDV high level bypass switch

would not have caused a scram had the unit been at power since the switch function is bypassed by design with the reactor mode switch in the Startup or Run positions.

#### Corrective Action

The adequacy of the cooling system power supply circuit design is being evaluated. All operators received a reading assignment discussing the event and the breaker coordination problems. Also included was guidance on how to properly respond to breaker trips of this type in the future.

Industry information as it pertains to this event, such as NRC Information Notice 82-53 which discusses rapid cooldown of an overheated and energized transformer, will be routed to appropriate operations personnel. In addition, this information will be included in Plant Operator and Licensed Operator training.

The auto transfer relays were checked on the other Unit 3 transformers and were found to be working properly. The auto transfer relays on the Unit 2 transformers will be checked during the current refuel outage. A routine test will be developed to perform an operability check of the auto transfer relay.

The operator involved in the second scram was coached by the Shift Manager (Utility, Licensed) and the Superintendent of Operations (Utility, Licensed) with regard to following procedures.

#### Previous Similar Events

No previous similar LERs have been identified in which a scram resulted from a Main Transformer problem or the Scram Discharge Volume not being fully drained prior to scram reset.

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Figure 1 "Main Transformer Cooling System" omitted.

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CCN 91-14020

PHILADELPHIA ELECTRIC COMPANY  
PEACH BOTTOM ATOMIC POWER STATION  
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PEACH BOTTOM--THE POWER OF EXCELLENCE

February 15, 1991

Docket No. 50-278

Document Control Desk  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555

SUBJECT: Licensee Event Report  
Peach Bottom Atomic Power Station - Unit 3

This LER concerns a reactor scram following the failure of the '3A'  
Main Transformer.

Reference: Docket No. 50-278  
Report Number: 3-91-001  
Revision Number: 00  
Event Date: 01/16/91  
Report Date: 02/15/91  
Facility: Peach Bottom Atomic Power Station  
RD 1, Box 208, Delta, PA 17314

This LER is being submitted pursuant to the requirements of 10 CFR  
50.73(a)(2)(iv).

Sincerely,

cc: J. J. Lyash, USNRC Senior Resident Inspector  
T. T. Martin, USNRC, Region I

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